



PEAK acoustics

Noise Assessment Report

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Environmental Noise Assessment

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Site: 7 Derby Street, Leek, ST13 6HN

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Executive Summary

An environmental noise assessment has been undertaken at 7 Derby Street, Leek, ST13 6HN where it has been proposed to redevelop an existing property into a 5 bedroom HMO.

Environmental noise monitoring was undertaken at the site from Monday 2nd to Tuesday 3rd August 2021. Noise affecting the development was determined to be primarily from pedestrian and commercial activity along Derby Street. Slow moving traffic down the high street was also noted. Less prominent noise sources included distant traffic and birdsong.

Design limits were derived for internal noise levels with guidance drawn from BS8233:2014, ProPG and WHO guidelines. Bespoke design limits were applied to bedrooms along the front façade due to the nature of the noise sources present.

Selected Assessment Criteria

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Front Bedrooms	32 dB L _{Aeq, 16hour}	-
Sleeping		-	27 dB L _{Aeq, 8hour} 42 dB L _{AFmax} *
Resting	Rear Bedrooms	35 dB L _{Aeq, 16hour}	-
Sleeping		-	30 dB L _{Aeq, 8hour} 45 dB L _{AFmax} *

**individual noise events to not normally exceed 45dB L_{Amax,F} more than 10 times a night.*

A glazing and ventilation scheme has been given to ensure conditions in habitable rooms remain within the desired design criteria, given below.

Proposed Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance R _w (+C _{tr}) [1]	Example Specification [2]	Minimum Performance D _{ne,W} , +C _{tr} (Open)	Example Specification / Strategy
HMO Rooms				
Front Façade – Rooms 2 & 3	37 (31)	4 / 16 / 10	32	Trickle Ventilators
Rear/Side Façade – Rooms 1, 4 & 5	30 (26)	4 / 16 / 4	32	Trickle Ventilators

Passive window/wall ventilators are deemed suitable for all areas. Recommended Example products for this would be a standard low spec trickle ventilator *Titon Trimvent XS13 4400EA*.

A sound test was undertaken on Tuesday 3rd August between the occupied ground floor commercial unit and the proposed HMO at 1st floor level. A room-to-room transmission calculation found that the existing ceiling/floor partition would serve to suitably control internal sound transmission, ensuring no loss of amenity for future residents.

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1. Introduction

1.1. Proposal

It has been proposed to develop a plot of land at 7 Derby Street, Leek, ST13 6HN where it has been proposed to redevelop an existing property into a 5 bedroom HMO.

1.2. Reason for Assessment

The proposal lies on a busy high street with retail units and hospitality venues in the immediate surrounding area, concerns were raised by the council with the aim to avoid noise giving rise to significant adverse impacts on health and quality of life as a result of the re-development. A noise assessment is to be submitted as part of the planning application to ensure desirable internal noise levels are met within habitable rooms of the proposed development due to noise associated with retail and hospitality venues. The assessment aims to provide a sound insulation scheme for the development.

1.3. Planning Policy & Guidance

1.3.1. National Planning Policy Framework (NPPF)

Guidance for the assessment of noise affecting new residential development is given in the National Policy Framework (NPPF). Section 109 of the NPPF states.

"The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of...noise pollution."

Section 123 states the following aims:

- *"avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of a new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The NPPF seeks to limit the exposure of new development to unacceptable levels of noise, although the policy does not seek to prescribe what constitutes an unacceptable level of noise.

1.3.2. Noise Policy Statement of England (NPSE)

Noise Policy Statement for England (NPSE) was published in March 2010 by The Department for Environment, Food and Rural Affairs (DEFRA). The explanatory note of NPSE defines the terms used in NPPF:

"Significant adverse" and 'adverse';

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effect on health and quality of life can be detected. 2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur."

The NPSE does not define the SOAEL numerically, stating at paragraph 2.22:

"2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the "NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

There is no local or national guidance on how the three terms should be defined numerically, it is for the assessor to collate and interpret appropriate guidance on noise, such as may be found in British Standards, and correlate the guidance with the concepts of NOEL, LOAEL and SOAEL.

1.3.3. Planning Practice Guidance: Noise (PPGN)

In March 2014, the Government released the PPG on noise, revised July 2019. This document sets out a number of principles and reinforces the guidance set out in the NPPF and NPSE.

Paragraph 001 of PPGN notes that:

"Noise needs to be considered when new development may create additional noise and when new developments would be sensitive to the prevailing acoustic environment."

It goes on to note in paragraph 003 that:

"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.”*

The PPGN broadly repeats the NPSE definitions of the NOEL, LOAEL AND SOAEL and it provides a summary table to explain how the terms relate to each other and to typical human response to sound. The table is replicated below in **Table 1**.

Table 1. – PPGN Noise Exposure Hierarchy

Perception	Examples of Outcome	Increasing Effect Level	Action
Not Noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and small changes in behaviour and/or attitude, e.g. turning up volume of televisions; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the areas such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory or non-auditory	Unacceptable Adverse Effect	Prevent

The PPGN provides advice on how to mitigate the effects of noise, noting that there are options to reduce noise at source, to optimise site layouts and to use planning conditions.

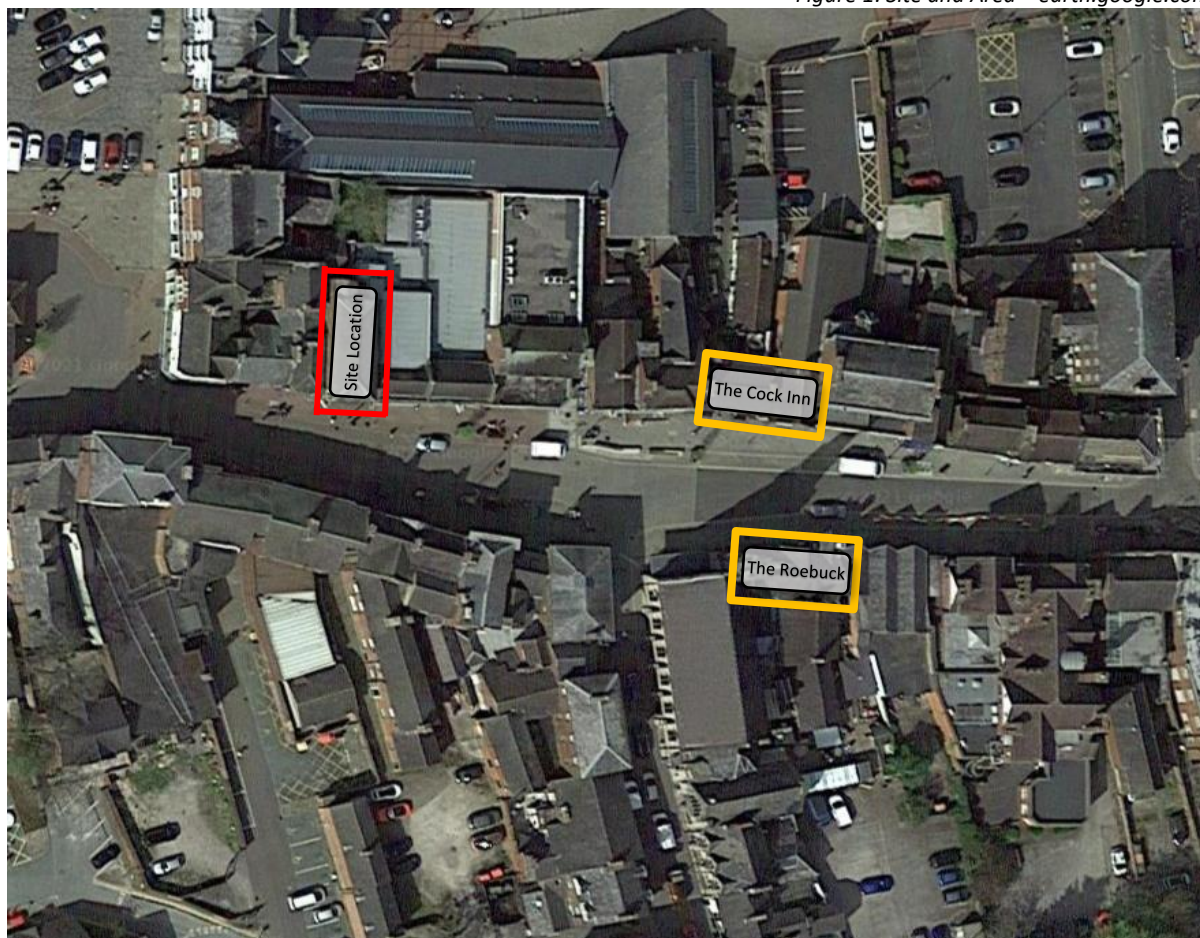
2. Assessment Methodology

2.1. Site Description

The site is located along Derby Street, a busy high street populated with various retail units and hospitality venues. The nearest hospitality venues visible from the front façade of the proposal being *The Cock Inn* and *The Roebuck* to the east. Road traffic also have access along Derby Street. 1st floor flats are present within the surrounding area above said commercial units.

The site location is shown in **Figure 1** below.

Figure 1: Site and Area – earth.google.com



2.2. Design Criteria Summary

Guidance on the assessment and design criteria have been drawn from BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings*. Table 4 in Section 7.7.2 of this standard suggests indoor ambient noise levels for dwellings. A summary of this criteria is given below.

Desirable internal noise levels are to be maintained as given in BS8233:2014:

- *<35dB $L_{Aeq, 16hr}$ within living areas during the day (07:00 – 23:00)*
- *<30dB $L_{Aeq, 8hr}$ within bedrooms at night (23:00 – 07:00)*
- *45dB L_{Amax} should not be regularly exceeded within bedrooms at night (23:00 – 07:00)*

WHO Guidelines help to define the L_{Amax} parameter requirements:

“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991)”.

The recommended design criteria is applicable to rooms at the rear façade of the proposal. However, bespoke design criteria has been utilised for HMO rooms present along the front façade of the proposal, these are detailed below:

- *<32dB $L_{Aeq, 16hr}$ within living areas during the day (07:00 – 23:00)*
- *<27dB $L_{Aeq, 8hr}$ within bedrooms at night (23:00 – 07:00)*
- *42dB L_{Amax} should not be regularly exceeded within bedrooms at night (23:00 – 07:00)*

Additional guidance may be drawn from ProPG: Planning & Noise which was published “to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England.”

2.3. Assessment Standards & Justification

‘BS8233:2014 – Guidance on sound insulation and noise reduction for buildings’ is a recognised standard for assessing and mitigating environmental noise levels upon a proposed noise sensitive development. The standard gives a rigorous calculation method for determining interior noise levels based on measured environmental noise levels.

‘World Health Organisation Guidelines for Community Noise (1999)’ details suitable noise levels for various activities within residential and commercial buildings.

‘Pro PG – Professional Practice Guidance on Planning & Noise’ provides practitioners with guidance on a recommended approach to the management of noise within the planning system in England.

3. Environmental Noise Survey

3.1. Survey Measurements

To assess the environmental noise levels affecting the proposed development, an unattended noise survey was undertaken at the site from Monday 2nd – Tuesday 3rd August 2021.

Measurements of $L_{Aeq,T}$ and L_{AFmax} were logged in 5-minute intervals in accordance with the provisions of BS7445 - 'Description and Measurement of Environmental Noise'.

3.2. Measurement Locations

At position M1, the microphone was positioned out of the 2nd floor window of the façade facing Derby Street, fully exposed to all nearby noise sources. At position M2, the microphone was positioned out of the rear façade 1st floor window.

The monitoring locations are shown in **Figure 2** in Section 3.5.

3.3. Weather Conditions

Daytime temperatures of 15 – 21°C were noted during the survey with negligible winds and little precipitation; deemed suitable for conducting environmental noise monitoring. Detailed weather conditions are given in **Appendix C**.

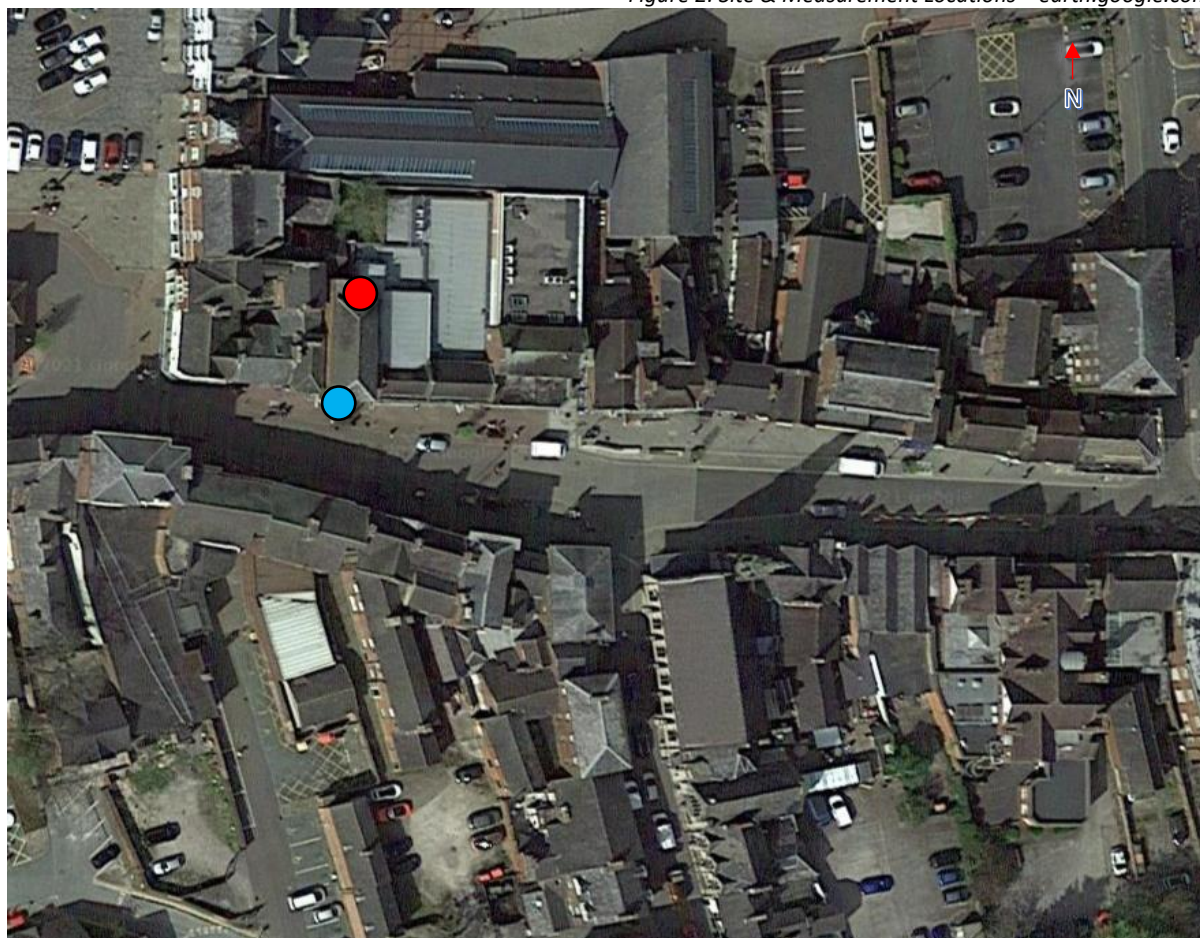
3.4. Measurement Equipment

Measurement equipment complies with accuracy requirements for common environmental noise measurement standards. Equipment was calibrated before and after use and no significant drift occurred during measurements. Up to date calibration certification can be provided upon request. A detailed equipment list is given in **Appendix B** with calibration information in **Appendix D**.

3.5. Monitoring Location

The site and unattended noise monitoring location is shown on Figure 2 below.

Figure 2: Site & Measurement Locations – earth.google.com



 Monitoring Location (M1)

 Monitoring Location (M2)

3.6. Noise Affecting the Development

The main contributor of noise affecting site arises from pedestrian activity along Derby Street, thought to be originating from retail activity. Hospitality activity is present later during the day but is lower in comparison. Further, *The Cock Inn* and *The Roebuck* are only operational until midday throughout the week and have minimal outdoor seating along Derby Street. Noise event recording data detected what appears to be Large Goods Vehicles passing in the early hours of the morning. Distant traffic was noted when retail activity noise levels subsided. Natural noise sources included birdsong and rustling of trees.

3.7. Environmental Noise Levels

The results from the noise monitoring at position M1 and M2 are summarised below.

Full environmental noise monitoring data is given in **Appendix E**.

Table 2. – Environmental Measurement Summary

Measurement	Date(s)	Period	L _{Aeq} (dB)	Typical* L _{AFmax} (dB)
M1 – Front	2 nd & 3 rd August 2021	Day (16hr Aggregate Periods)	50.5	-
	2 nd – 3 rd August 2021	Night (8hr)	45.6	73.5

Measurement M1 was subject to a -3 dB façade correction due to being in close proximity to a reflective surface.

* The given ‘Typical’ L_{AFmax} levels above are an average of the spectra of the noisiest 10 events of the night-time periods; the maxima levels selected would not ordinarily be exceeded more than 10 times within the night-time, in accordance with the WHO L_{AFmax} parameter guidance.

To aid in determining the difference in noise levels between the front and rear of the development, a comparative measurement was undertaken at position M2 on Tuesday 3rd August 2021. Data from measurement M1 will be utilised to directly compare with measurement M2. The exact same measurement intervals from measurement M1 and measurement M2 have been compared below.

Table 3. – Measurement Results Difference

Period	Measurement	Location	L _{Aeq,T=5min} (dB)	Difference, dB
17:20 – 17:30	M1	Front	45.4	7.7
17:20 – 17:30	M2	Rear	37.7	

A 7.7 dB difference in noise levels was noted between measurement data M1 and M2. Therefore, a modest 5 dB reduction has been applied to derive noise levels at the rear.

The resultant external noise levels for front and rear areas are summarised in the table below.

Table 4. – Corrected Environmental Noise Levels

Zone(s)	Period	L _{Aeq,T} (dB)	Typical L _{AFmax} (dB)
Front	Daytime (16hr)	50.5	-
	Night (8hr)	45.6	73.5
Rear	Daytime (16hr)	45.5	-
	Night (8hr)	40.6	68.5

The ‘Rear’ façade corrected noise levels, displayed in **Table 4**, have been utilised within this assessment.

4. Internal Noise Level Assessment

4.1. Design Criteria

BS8233:2014 - *Guidance on sound insulation and noise reduction for buildings* suggests indoor ambient noise levels for dwellings in Table 4, Section 7.7.2. These are summarised below.

Table 5. – BS8233 Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$
		-	45 dB L_{AFMax}

**individual noise events to not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night.*

BS8233 states that the guideline values given above are for ‘noise without character’, such as that from road, rail or air traffic. For defining ‘character’, a note in Section 7.7.1 of BS8233 states:

“Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate.”

In considering the retail and hospitality noise affecting the front of the proposal, as discussed in Section 3.6, it is deemed appropriate to consider lower guideline indoor ambient noise level values for rooms at the front elevation. BS8233 and ProPG do not specify lower limits for such noise climates, however, a 3 dB correction to the indoor ambient noise level criteria is deemed appropriate given the potentially sporadic nature of noise associated with retail and hospitality activity.

With regards to Maxima noise events, ProPG Planning and Noise, p. 13, states:

“NOTE 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night”.

Considering the noise climate affecting the proposed dwelling, it is deemed appropriate to consider individual night-time L_{AFmax} noise events measured during the noise survey.

The standard indoor ambient noise level criteria given in **Table 5** is deemed appropriate for the rear elevations.

The criteria to be considered in the assessment at different elevations is summarised below. As the proposal is for House in Multiple Occupation (HMO), the bedrooms within the property will be considered for both day and night-time criteria.

Table 6. – Selected Assessment Criteria

Elevation	Activity	Location	07:00 to 23:00	23:00 to 07:00
Front	Resting	HMO Bedrooms	32 dB $L_{Aeq,16hr}$	-
	Sleeping		-	27 dB $L_{Aeq,8hr}$
			-	42 L_{Amax}
Rear	Resting	HMO Bedrooms	35 dB $L_{Aeq,16hr}$	-
	Sleeping		-	30 dB $L_{Aeq,8hr}$
			-	45 L_{Aax}

4.2. Assessment Noise Levels

In the interest of a robust assessment, the loudest of the measurement intervals are to be considered in the assessment of internal noise levels and determining the sound insulation scheme with reference to 'Note 2 of Table 4' in BS8233 given in Section 4.1.

The resultant external noise levels for the assessment of internal ambient noise levels are summarised in the table below.

Table 7. – Assessment Noise Levels

Location	Period	$L_{Aeq,T}$ (dB)	Typical L_{AFmax} (dB)
Front	Daytime (16hr)	50.5	-
	Night (8hr)	45.6	73.5
Rear	Daytime (16hr)	45.5	-
	Night (8hr)	40.6	68.5

4.3. Internal Noise Level Calculations

Internal noise levels have been calculated to demonstrate that the proposed dwellings can achieve the desired design criteria when appropriate glazing and ventilation systems are utilised.

Room dimensions and glazed areas have been approximated based on the drawings supplied to Peak Acoustics and drawn by 'ANVA Architectural Engineering and Licensing'. Note that assessment is not required for each individual room. The selection of habitable rooms has been chosen as representative of the most noise sensitive areas, which have been selected on account of room and windows sizes.

The noise levels that will exist within the habitable areas of the finished development have been predicted based on the existing noise environment at the site and outline details for the design of the development. The predicted noise levels have been compared with appropriate design criteria. Where the criteria have been predicted to be exceeded, suitable mitigation measures have been identified.

Calculations of internal ambient noise levels have been undertaken using the 'rigorous calculation' method given in Annex G2 of BS8232:2014. Full details of the calculations are provided in **Appendix F**.

5. Glazing & Ventilation Sound Insulation Scheme

The following revised glazing and ventilation scheme has been provided to achieve the desirable internal noise levels displayed in **Table 6**, as the existing scheme failed to attain this. This is specified in the table below.

Table 8. – Glazing & Ventilation Scheme

Internal Space	Glazing		Ventilation	
	Minimum Performance $R_w (+C_{tr})$ [1]	Example Specification [2]	Minimum Performance $D_{ne,W} (+C_{tr})$ (Open)	Example Specification / Strategy
HMO Rooms				
Front Façade – Rooms 2 & 3	37 (31)	4 / 16 / 10	32	Trickle Ventilators
Rear/Side Façade – Rooms 1, 4 & 5	30 (26)	4 / 16 / 4	32	Trickle Ventilators

N.B Note that other glazing configurations and ventilators can achieve the given minimum performance requirements.

[1] The sound insulation value of the glazing should take into account the glass as well as the frame and perimeter seal.

[2] Example glazing specification format given as 'XXmm Float / 16mm Air gap / XXmm Float'.

6. Internal Noise Levels

It is determined that by using mitigation as specified in **Table 8** for the building façades, the outcome summarised in the following table is achieved.

Table 9. – Internal Noise Levels

Internal Space	Noise Parameter	Internal Noise Level (dB)	Within Design Criteria?
Bedrooms 2 & 3	Daytime $L_{Aeq, 16hr}$	21	Yes
	Night-time $L_{Aeq, 8hr}$	16	Yes
	Night-time L_{AFmax}	42	Yes
Bedrooms 1, 4 & 5	Daytime $L_{Aeq, 16hr}$	16	Yes
	Night-time $L_{Aeq, 8hr}$	11	Yes
	Night-time L_{AFmax}	37	Yes

For the daytime assessment of front façade bedrooms, the bespoke design criterion sets a limit of 32 dB $L_{Aeq, 16hr}$ for resting conditions. All results, with implementation of the derived sound insulation scheme given in **Table 8**, would place the internal daytime noise levels as below 32 dB, therefore within the desired limit. For the daytime assessment of rear façade bedrooms, BS8233:2014 suggests a desirable guideline of 35 dB $L_{Aeq, 16hr}$. All results would place the internal daytime noise levels as below 32 and 35 dB respectively, therefore within desired guidelines.

For the night-time assessment of front façade bedrooms, the bespoke design criterion sets a limit of 27 dB $L_{Aeq, 8hr}$ for sleeping conditions. For the assessment of rear façade bedrooms, BS8233:2014 suggests a desirable guideline of 30 dB $L_{Aeq, 8hr}$. Individual noise events (Measured with fast time-weighted Maximum) should not normally exceed 42 dB L_{AFmax} within front façade bedrooms and 45 dB L_{AFmax} within rear façade bedrooms. Implementation of the derived sound insulation scheme given in **Table 8** would place the internal continuous night-time noise levels as below 27 dB and 30 dB respectively and the maximum noise events as typically below 42 dB L_{AFmax} and 45 dB L_{AFmax} , therefore within desired guidelines.

It is noted that BS8233 section 7.2.2 states ‘If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level’. This statement implies that the use of closed windows and an alternative means of ventilation is acceptable.

All habitable rooms will be provided with either: proprietary wall or window mounted trickle vents, or an acoustic attenuated passive ventilation system, which provides an open area equivalent to a partially open window, to achieve background ventilation in accordance with the Building Regulations requirements as per the table above. This will negate the need for open windows for the purposes of ventilation.

7. Internal Sound Transmission from Commercial Unit

To ensure noise from the retained commercial space is sufficiently controlled within the proposed residential development, a sound transmission calculation has been undertaken using assumed noise levels and measured transmission loss through the existing ceiling/floor partition.

7.1. Assumed Retail Noise Levels

The commercial space is currently occupied and is a Class A1 retail space. Noise within such uses typically comprises of spoken voice from employees and customers and low-level music from a radio. Spectra and noise levels for such sources have been sourced from Peak Acoustics’ data library and a worst-case assumption has been made. These noise levels are given below.

Table 10. – Class A1 (E) Noise Levels

Source	63	125	250	500	1k	2k	4k	dBA
Class A1 Use	63	69	65	66	64	61	56	73

7.2. Existing Sound Insulation

An airborne sound insulation test in accordance with ISO-140-4 was conducted between the ground floor commercial unit and 1st floor HMO room 2 on Tuesday 3rd August 2021. On site observations indicated the receiver room having a volume of 79.5m³.

The resultant transmission loss measured for the separating floor/ceiling partition is detailed in **Table 11**.

Test results are detailed in **Appendix G**.

Table 11. – Sound Insulation Loss

Ceiling/Floor Partition	63	125	250	500	1k	2k	4k
Transmission Loss (D _{nt})	29	29	35	39	42	47	48

7.3. Sound Transmission Outcome

Target criteria for sound transmission levels within the studio apartment has been selected as noise rating curve, NR25.

A summary of the sound transmission calculation to demonstrate the performance of the proposed wall and resulting internal noise levels is tabulated below.

Table 12. – Internal Sound Transmission

Source/Internal Space/Criteria	63	125	250	500	1k	2k	4k	dBA
GF Retail Class A1 (Source)	63	69	65	66	64	61	56	73
1 st F HMO Room 2 (Receiver)	33	39	30	26	22	14	8	29
NR25	55.2	43.7	35.2	29.2	25.0	21.9	19.5	-
Difference, dB	-22	-4	-5	-3	-3	-8	-11	-

Table 12 demonstrates the existing ceiling/floor partition would serve to suitably control internal sound transmission, ensuring no loss of amenity for future residents.

Full calculations are given in **Appendix F**.

8. External Amenity Areas

BS8233:2014 provides a desirable guideline of 50 dB L_{Aeq,16hr} for external amenity spaces and an acceptable guideline of 55 dB L_{Aeq,16hr} for noisier environments, although at current there is no planned external amenity area associated with the proposal.

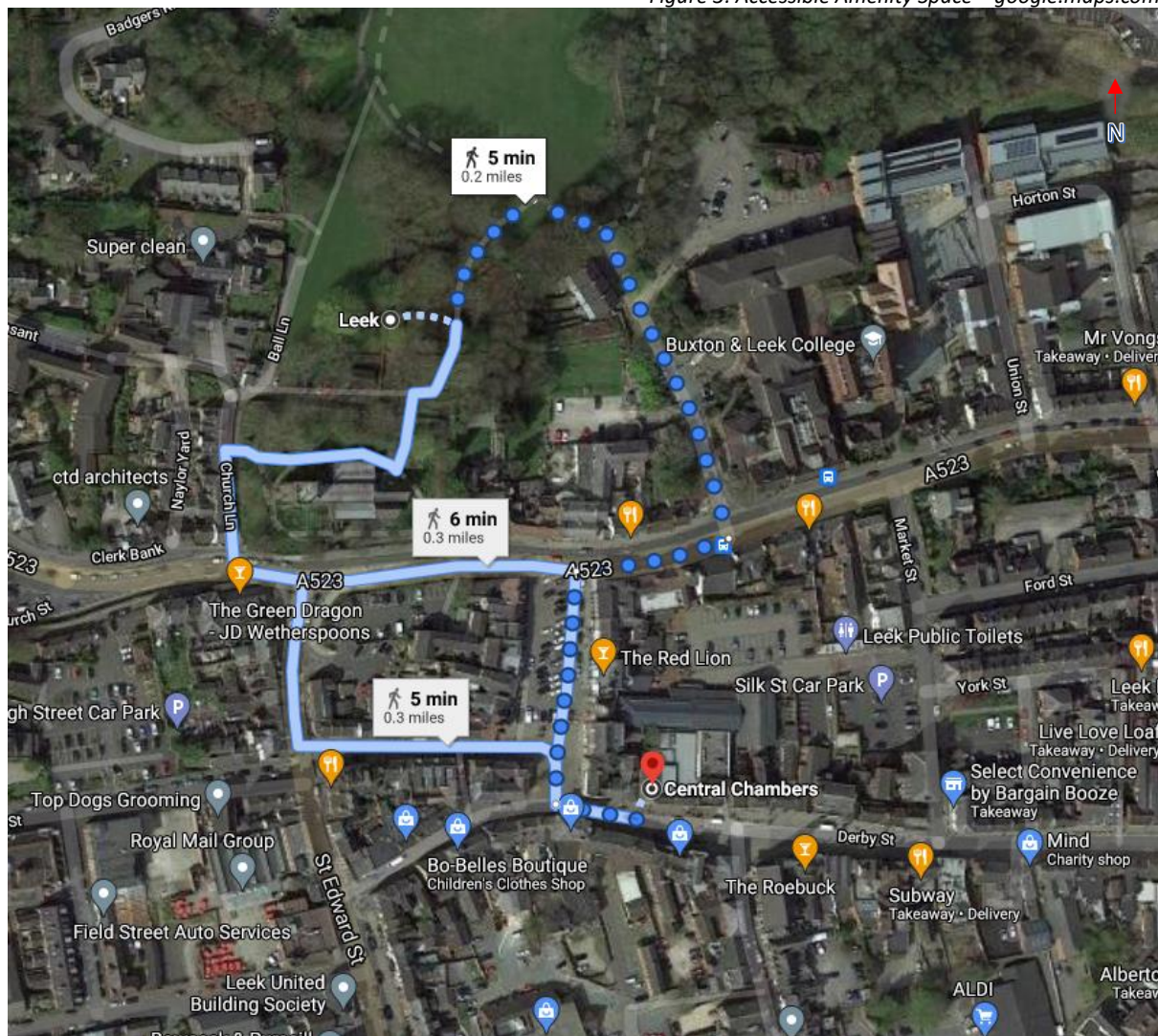
However, 'ProPG: Planning & Noise guidance' states the following:

"Where, despite following a good acoustic design process, significant adverse noise impacts remain on any private external amenity space (e.g. garden or balcony) then that impact may be partially off-set if the residents are provided, through the design of the development or the planning process, with access to:

A relatively quiet, protected, publicly accessible, external amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance). The local planning authority could link such provision to the definition and management of Quiet Areas under the Environmental Noise Regulations." – P.18 Element 3

Brough Park, an area of quiet greenery, is accessible to the public and is around a 5 minutes' walk from the proposal. This is shown in Figure 3 below.

Figure 3: Accessible Amenity Space – google.maps.com



Due to the short distance between the proposal and Brough Park, future residents will have easy access to quiet external amenity spaces.

9. Conclusions

An environmental noise assessment has been undertaken regarding 7 Derby Street, Leek, ST13 6HN where it has been proposed to redevelop an existing property into a 5 bedroom HMO.

Environmental noise monitoring was undertaken at the site from Monday 2nd to Tuesday 3rd August 2021. Noise affecting the development was determined to be primarily from pedestrian and commercial activity along Derby Street.

Design limits were derived for internal noise levels with guidance drawn from BS8233:2014, ProPG and WHO guidelines. Bespoke design limits were applied to bedrooms along the front façade due to the nature of the noise sources present. The proposed glazing and ventilation scheme ensures conditions within habitable rooms remain within the design criteria.

An airborne sound insulation test was undertaken on Tuesday 3rd August between the occupied ground floor commercial unit and the proposed HMO at 1st floor level. A room-to-room transmission calculation found that the existing ceiling/floor partition would serve to suitably control internal sound transmission, ensuring no loss of amenity for future residents.

A discussion on external amenity spaces has been provided. It is thought that future residents will have easy access to quiet external amenity spaces in the surrounding area.

APPENDIX A – Measurement Details

Measurement(s)	Kit	Start Date	Start Time	End Date	End Time
M1	A2	06/07/2021	12:35	08/07/2021	14:25
M2	STK3	06/07/2021	12:45	06/07/2021	13:00

APPENDIX B - Equipment Details

Kit	Equipment	Make	Model	Class	Serial Number
A4	Sound Meter	Svantek	971	1	60688
A4	Pre-Amp	Svantek	SV18	1	62781
A4	Microphone	ACO	7052E	1	66703
STK 3	Sound Meter	Svantek	977	1	36815
STK 3	Pre-Amp	Svantek	SV12L	1	47589
SKT 3	Microphone	ACO	7052E	1	63891

APPENDIX C - Meteorology Details

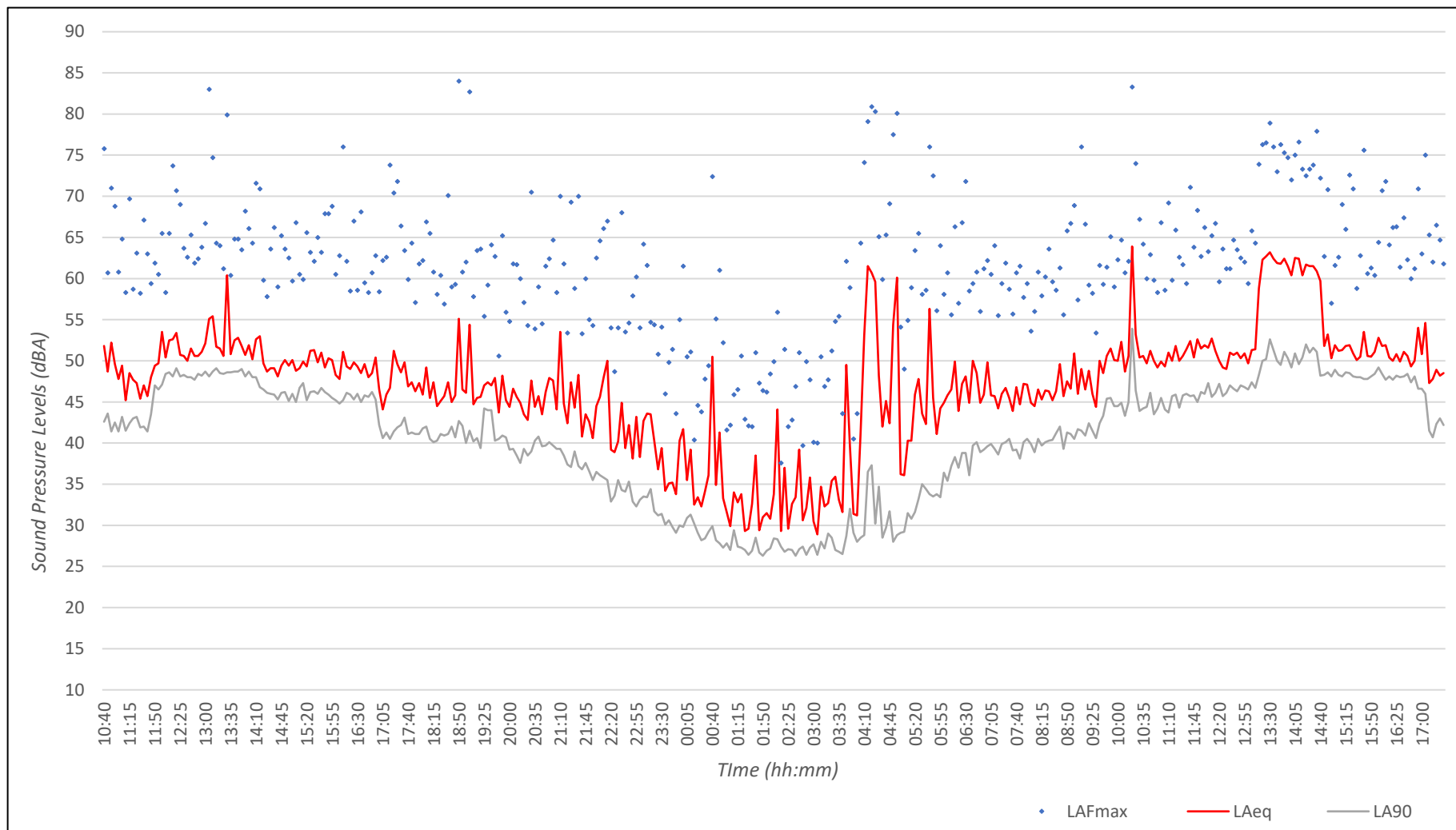
Date	Temp C°	Wind Speed m/s	Wind Direction	Humidity %	Precipitation mm	Cloud Cover (Oktas)
02/08/21	15	1 – 2	WSW	77	0.2	5/8
03/08/21	21	1 – 2	WNW	55	0.3	1/8

APPENDIX D - Calibration Details

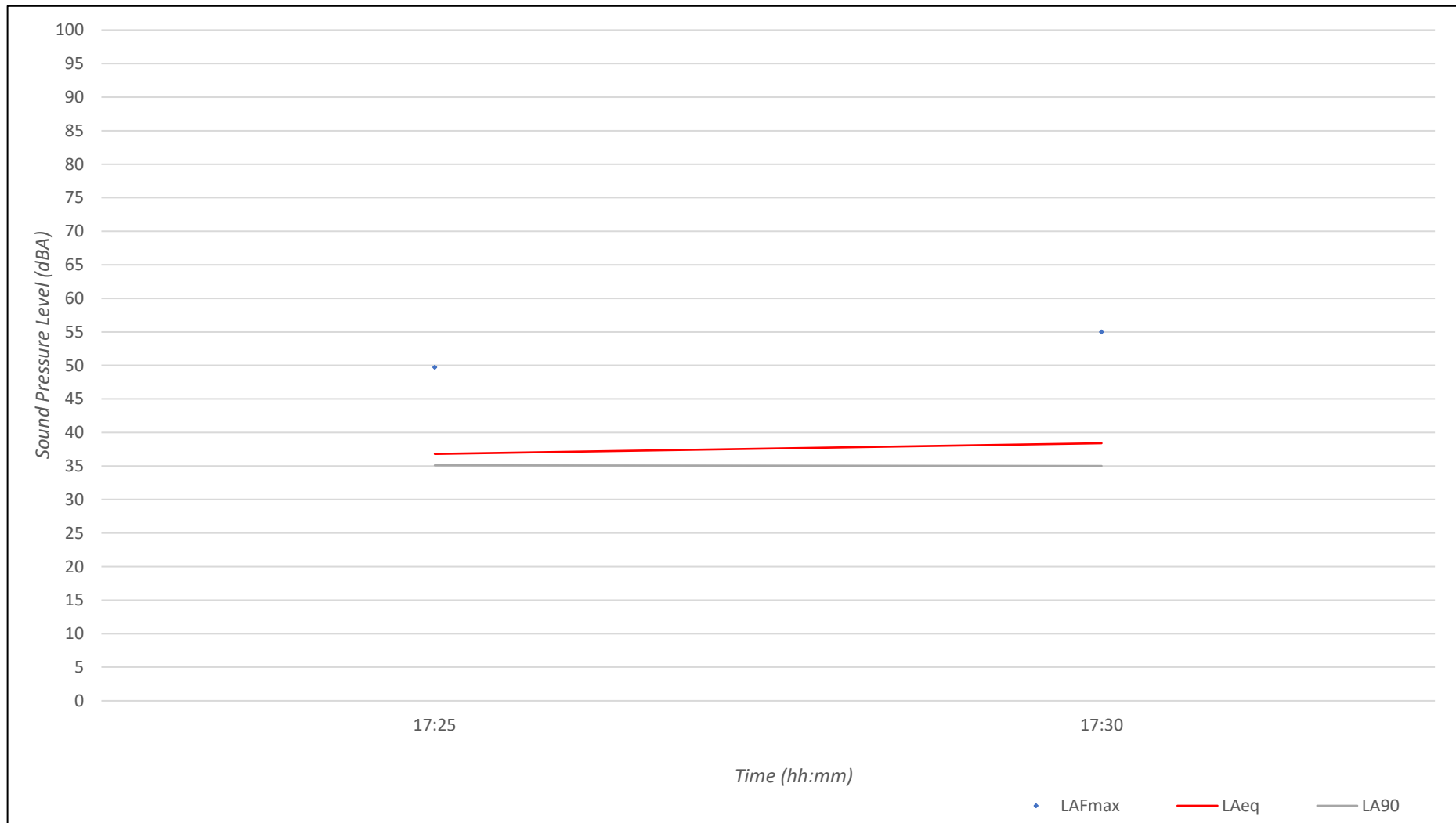
Kit	Calibrator Ref Level (dB)	Deviation Before (dB)	Deviation After (dB)
A4	113.9	-0.99	-0.99

APPENDIX E – Noise Survey Results

Environmental Noise Measurement M1, 2nd – 3rd August 2021



Environmental Noise Measurement M2, 3rd August 2021



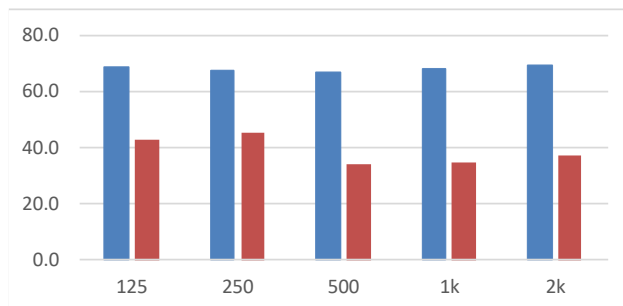
APPENDIX F – Calculations

BS8233:2014 Rigorous Design Calculations

Bedroom 2 - Night LAMax

Room Properties		Sound Insulation Properties					
Room Width (m)	5.1	Freq. Hz	125	250	500	1k	2k
Room Depth (m)	4.8	Wall, dB R _{w+Ctr}	41	45	45	54	58
Room Height (m)	3.2	Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazed Area (m ²)	4.2	Glazing, dB R _{w+Ctr}	27	23	33	41	48
Is dwelling within roof	☒	Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level 73.5 dB LAMax

Internal Levels 41.9 dB LAMax

Insertion Loss 31.6 dB LAMax

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	37(31)	dB R _{w+Ctr}	Double Glazing 4 / 16 / 10
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000244	0.0012	0.00012	0.0002	0.00024
Term 2	0.000513	0.0013	0.00013	2E-05	4.1E-06
Term 3	5.9E-05	2E-05	2.3E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	42.6	45.2	34.1	34.4	36.9
Internal, dB LAeq	26.5	36.6	30.9	34.4	38.1

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,eff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{A0}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{re}}{S} 10^{-\frac{R_{re}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Bedroom 2 - Night Laeq

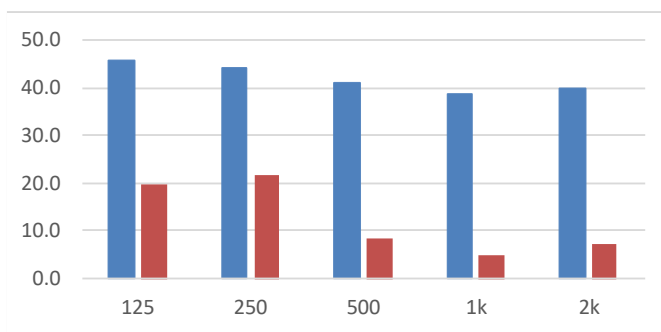
Room Properties

Room Width (m)	5.1
Room Depth (m)	4.8
Room Height (m)	3.2
Glazed Area (m ²)	4.2
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R _{w+Ctr}	41	45	45	54	58
Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazing, dB R _{w+Ctr}	27	23	33	41	48
Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level 45.6 dB LAeq

Internal Levels 15.6 dB LAeq

Insertion Loss 30.0 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	37(31)	dB R _{w(+Ctr)}	Double Glazing 4/16/10
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000244	0.0012	0.00012	0.0002	0.00024
Term 2	0.000513	0.0013	0.00013	2E-05	4.1E-06
Term 3	5.9E-05	2E-05	2.3E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	19.6	21.7	8.5	5.0	7.3
Internal, dB LAeq	3.5	13.1	5.3	5.0	8.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{n}}{S} 10^{-\frac{R_{n}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Bedroom 2 - Day Laeq

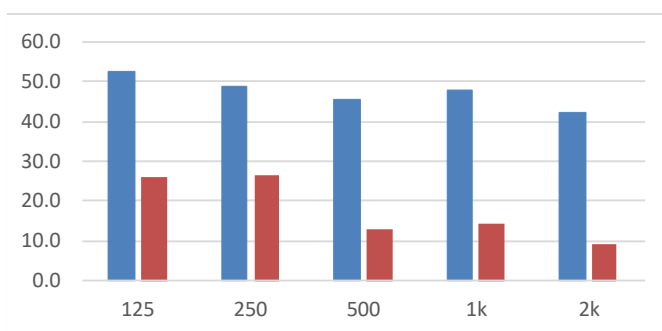
Room Properties

Room Width (m)	5.1
Room Depth (m)	4.8
Room Height (m)	3.2
Glazed Area (m ²)	4.2
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R _{w+Ctr}	41	45	45	54	58
Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazing, dB R _{w+Ctr}	27	23	33	41	48
Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level	50.5 dB LAeq
Internal Levels	20.7 dB LAeq
Insertion Loss	29.8 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	37(31)	dB R _{w(+Ctr)}	Double Glazing 4/16/10
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.000244	0.0012	0.00012	0.0002	0.00024
Term 2	0.000513	0.0013	0.00013	2E-05	4.1E-06
Term 3	5.9E-05	2E-05	2.3E-05	3E-06	1.2E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	26.1	26.4	13.0	14.4	9.3
Internal, dB LAeq	10.0	17.8	9.8	14.4	10.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{ri}}{S} 10^{-\frac{R_{ri}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Bedroom 1 - Night LAMax

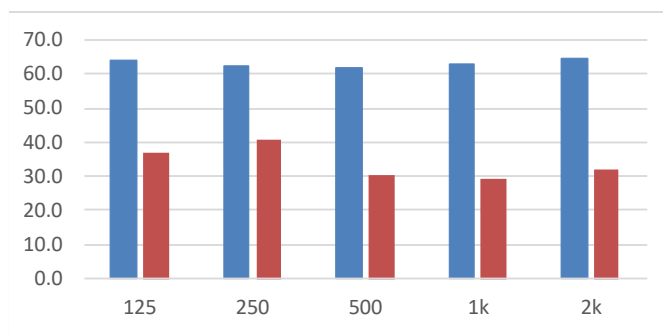
Room Properties

Room Width (m)	4.6
Room Depth (m)	3.9
Room Height (m)	3.2
Glazed Area (m ²)	1.5
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R _{w+Ctr}	41	45	45	54	58
Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazing, dB R _{w+Ctr}	24	18	26	40	45
Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level 68.5 dB LAMax

Internal Levels 37.0 dB LAMax

Insertion Loss 31.5 dB LAMax

Sound Insulation Requirement

Minimum Sound Insulation Requirement

Glazing	30(26)	dB R _{w(+Ctr)}
Ventilation	32	D _{n,e,w+Ctr}

Suitable Systems

Double Glazing
[4 / 16 / 4](#)
Hit & miss trickle vent
[Titon Trimvent XS13 4400EA](#)

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.00027	0.0014	0.00014	0.0002	0.00027
Term 2	0.000406	0.0016	0.00026	1E-05	3.2E-06
Term 3	7.13E-05	3E-05	2.8E-05	4E-06	1.4E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	36.8	40.5	30.5	29.2	31.9
Internal, dB LA _{eq}	20.7	31.9	27.3	29.2	33.1

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{ri}}{S} 10^{-\frac{R_{ri}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Bedroom 1 - Night LAeq

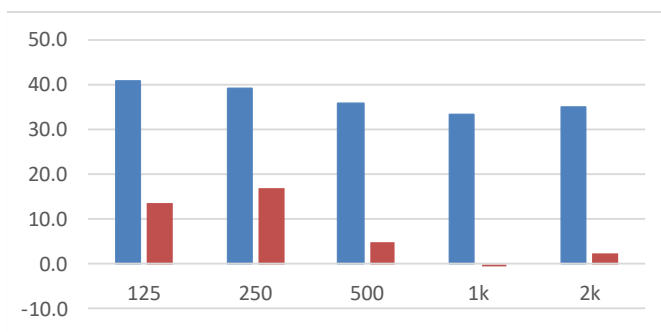
Room Properties

Room Width (m)	4.6
Room Depth (m)	3.9
Room Height (m)	3.2
Glazed Area (m ²)	1.5
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R _{w+Ctr}	41	45	45	54	58
Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazing, dB R _{w+Ctr}	24	18	26	40	45
Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level 40.6 dB LAeq

Internal Levels 10.8 dB LAeq

Insertion Loss 29.8 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement

Glazing	30(26)	dB R _{w(+Ctr)}
Ventilation	32	D _{n,e,w+Ctr}

Suitable Systems

Double Glazing
[4/16/4](#)
Hit & miss trickle vent
[Titon Trimvent XS13 4400EA](#)

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.00027	0.0014	0.00014	0.0002	0.00027
Term 2	0.000406	0.0016	0.00026	1E-05	3.2E-06
Term 3	7.13E-05	3E-05	2.8E-05	4E-06	1.4E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	13.8	17.0	4.9	-0.3	2.3
Internal, dB LAeq	-2.3	8.4	1.7	-0.3	3.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{n}}{S} 10^{-\frac{R_{n}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Bedroom 1 - Day LAeq

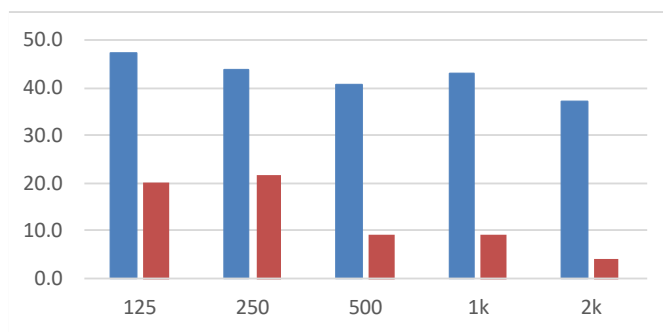
Room Properties

Room Width (m)	4.6
Room Depth (m)	3.9
Room Height (m)	3.2
Glazed Area (m ²)	1.5
Is dwelling within roof	☒

Sound Insulation Properties

Freq. Hz	125	250	500	1k	2k
Wall, dB R _{w+Ctr}	41	45	45	54	58
Roof, dB R _{w+Ctr}	41	45	45	54	58
Glazing, dB R _{w+Ctr}	24	18	26	40	45
Vents, D _{n,e,w+Ctr}	34	27	37	35	34

Noise Levels, dB



External Level	45.5 dB LAeq
Internal Levels	15.9 dB LAeq
Insertion Loss	29.6 dB LAeq

Sound Insulation Requirement

Minimum Sound Insulation Requirement			Suitable Systems
Glazing	30(26)	dB R _{w(+Ctr)}	Double Glazing 4 / 16 / 4
Ventilation	32	D _{n,e,w+Ctr}	Hit & miss trickle vent Titon Trimvent XS13 4400EA

Suitable systems given as reference only. Other products that achieve the required sound insulation values are available.

Technical Calculations

Frequency, Hz	125	250	500	1k	2k
Term 1	0.00027	0.0014	0.00014	0.0002	0.00027
Term 2	0.000406	0.0016	0.00026	1E-05	3.2E-06
Term 3	7.13E-05	3E-05	2.8E-05	4E-06	1.4E-06
Term 4	0	0	0	0	0
Internal, dB L _{eq}	20.3	21.7	9.4	9.1	4.3
Internal, dB LAeq	4.2	13.1	6.2	9.1	5.5

Façade Components

Wall	Brick and block, 75mm cavity
Roof	Not Within Roof Space
Glazing	Double Glazing
Vents	Hit & miss trickle vent

Calculations conducted in accordance with BS8233:2014 rigorous calculation method

$$L_{eq,2} = L_{eq,ff} + 10 \log_{10} \left(\frac{A_0}{S} 10^{-\frac{D_{0,2}}{10}} + \frac{S_{wi}}{S} 10^{-\frac{R_{wi}}{10}} + \frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}} + \frac{S_{ri}}{S} 10^{-\frac{R_{ri}}{10}} \right) + 10 \log_{10} \left(\frac{S}{A} \right) + 3$$

Room to Room Internal Sound Transmission Calculation

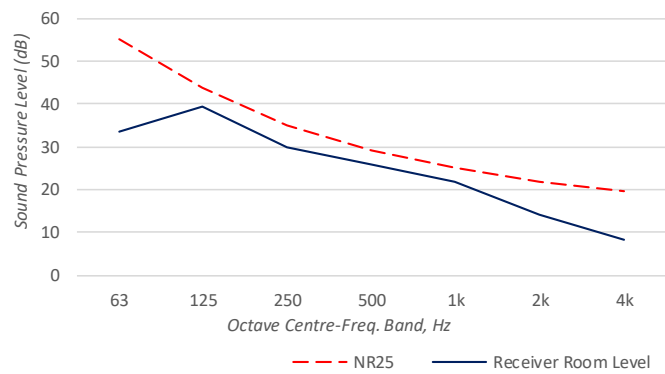
Room to Room Sound Transmission Calculation

Description:

Calculation of internal sound transmission from commercial ground floor shop to first floor HMO room 2.

1/1 Octave Centre-Freq. Band	Hz	63	125	250	500	1k	2k	4k	dBA
Source Noise Level, dB	dB	63	69	65	66	64	61	56	73
R1 Ceiling/Floor Partition	R, dB	29	29	35	39	42	47	48	
R2	R, dB	0	0	0	0	0	0	0	
R3	R, dB	0	0	0	0	0	0	0	
Comp R	Rcomp, dB	-29	-29	-35	-39	-42	-47	-48	
Receiver Room Level	dB	33	39	30	26	22	14	8	29

Partition & Receiver Room Details		
S1	m2	24.8
S2	m2	0.0
S3	m2	0.0
S Total	m2	24.8
S Shared Area	m2	24.8
Receiver Room Volume	m3	79.5
RT60	s	0.5
Absorptive Area	A, m2	25.6
Source Room Level	dBA	73
Receiver Room Level	dBA	28.7



For Graph Generation:

1/1 Octave Centre-Freq. Band	Hz	63	125	250	500	1k	2k	4k
NR25	dB	55.2	43.7	35.2	29.2	25.0	21.9	19.5
Receiver Room Level	dBZ	33.4	39.4	30.0	25.9	22.0	14.2	8.5
Difference		-22	-4	-5	-3	-3	-8	-11

APPENDIX G – Sound Insulation Certificate

Standardised level difference according to ISO 140-4 Field measurements of airborne sound insulation between rooms

Client:
Certificate: Airborne 1

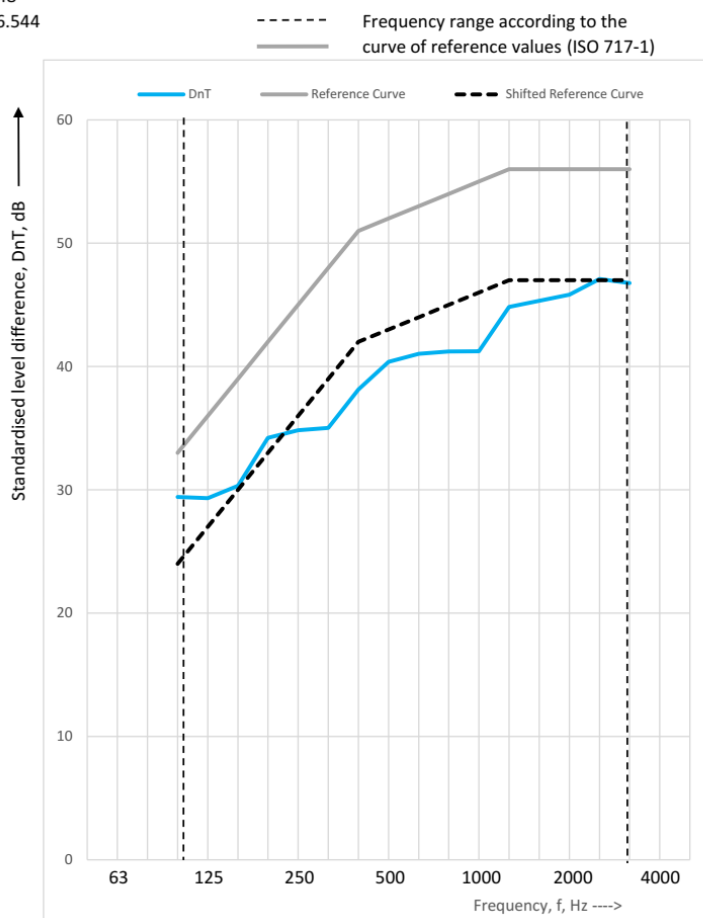
Date of test:

Project:

Source: GF - Shop
Receiver: 1st F - HMO Room 2

Source room volume (m³): 95.48
Receiver room volume (m³): 76.544

Frequency (Hz)	DnT 1/3 octave (dB)
50	
63	
80	
100	29.4
125	29.3
160	30.3
200	34.2
250	34.8
315	35.0
400	38.1
500	40.4
630	41.0
800	41.2
1000	41.2
1250	44.8
1600	45.3
2000	45.8
2500	47.1
3150	46.8
4000	
5000	



Rating according to ISO 717-1

Signed: 0

DnT,w (C; Ctr) = 43 (-1; -4) dB

Evaluation based on field measurement
results obtained by an engineering method

b: background corrected, B: maximum correction
No background noise influence on measured result

Certificate Ref: - 1

Test Institute:

Peak Acoustics Ltd

Date: 10/08/2021

APPENDIX H – Acoustic Terminology

To aid the understanding of acoustic terminology and the relative difference between noise levels the following background information is provided.

We perceive sound when the ear detects fluctuations in air pressure (sound waves), which are then processed by the brain and perceived as sound. Humans can hear an incredibly wide range of sound intensities ranging from jet engines to fingertips lightly brushing against each other. This range is quantified using a logarithmic scale called the decibel scale (dB). The comfortable range of the decibel scale typically ranges from 0dB (the threshold of hearing) to around 140dB. Here are some examples common environments and their typical noise levels.

Noise Level	Environment
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a moving car
60 to 70 dB(A)	Typical high street
100 to 110 dB(A)	Fire alarm at 1 metre away
140 dB(A)	Threshold of pain

Terminology

dB (decibel) – A unit used to quantify the pressure level of sound. Defined as 20 times the logarithm of the ratio between the root-mean-square pressure of a given sound field and a reference pressure level (2×10^{-5} Pa – threshold of hearing).

$L_{Aeq, T}$ – The equivalent continuous sound pressure level over a stated period. It quantifies a fluctuating sound level over a given period as the equivalent continuous sound level in which the same amount of acoustic energy is contained over. This is A-weighted in order to assess human perception.

L_{Amax} – the maximum RMS A-weighted sound pressure level occurring within a specified time period; the time weighting is typically either Fast or Slow.

A-Weighting – A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

R_w – The Weighted Sound Reduction Index (R_w) is a number used to rate the effectiveness of a soundproofing system or material.

$D_{n,e,w}$ – The Weighted Sound Reduction Index specifically for ventilators.

C_{tr} – C_{tr} is a spectrum adaptation term which method is defined in BS EN ISO 717. The standard uses a reference curve to determine the weighted value of airborne sound insulation. The spectrum adaptation terms C and C_{tr} may be used to take into account different source spectra. ' C_{tr} ' is the A-weighted urban traffic noise spectrum.



Let us introduce ourselves

Peak Acoustics formed in 2011, we are a fully accredited specialist consultancy and testing organisation.

We are a diverse team of Acoustic Consultants, Specialist Engineers and Building Compliance Technicians, with a network spanning the UK. We are proud to offer our services nationally, with no job too big or small.

We provide Acoustic Consultancy, Building Compliance Testing and Energy Services.

Additional Services

We offer an extensive range of services in the sectors of Acoustic Consultancy, Building Compliance & Energy Efficiency. We are able to put together custom packages combining multiple services which saves both time and money for you.

Building Compliance

- Sound Insulation Testing
- Air Tightness Testing
- Ventilation Testing
- Water Efficiency Calculations
- Sound Insulation Specification

Energy Efficiency

- SAP Calculations
- EPC's
- SBEM Calculations
- Energy Statements
- Sustainability Statements
- MEES Regulations
- Commercial EPC's

Acoustic Consultancy

- Noise Assessment for planning conditions
- Construction site noise monitoring
- Noise at work assessments
- Noise & Vibration Impact Assessments

Peace of mind

We are accredited and registered by all the relevant major UK authorities to provide the services we offer. Peak Acoustics is UKAS accredited for sound insulation testing, ATTMA registered for Air Leakage Testing. and our Energy team are all Domestic On-Completion Energy Assessors.

Our Added Value

We combine our detailed knowledge of building regulations with our technical understanding of building physics, acoustics and environmental sciences to maximise development quality. Our work ensures appropriate strategies and studies are prepared to demonstrate to local authorities how proposed developments will be of high quality and generate acceptable impact on the surrounding environment.

Contact Us

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Website: acousticsurveys.co.uk

Opening hours

Mon - Fri: 8:30 - 17:00